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Aesthetics in Geriatrics Using Plasma and Its Fractions in India

Hemamalini Narasimhan[1], Utkrist Lahoria[2] and Dilip Kachhawa[3*]

[1]Resident Dermatology (final year Postgraduate), Dr.SN medical college & MDM hospital, Jodhpur, India

[2]Resident Dermatology, AIIMS Jodhpur, India

[3]Senior professor and head, Department of dermatology, MDM hospital, Jodhpur, India

ABSTRACT

Introduction: Geriatric aesthetics is an evolving branch of cosmetology with extensive research conducted to minimize the invasiveness, number of visits and safety of the proposed modality. In developing country, the adding burden of cost hinders the practical application of standard aesthetic procedures used elsewhere. Platelet-rich plasma is an autologous preparation that is utilized in various fields of regenerative medicine.

Objectives: The fractions of plasma such as platelet-rich plasma, fibrin and fibrin matrix are reviewed in this article with our personal experience of plasma-fractions prepared in a resource-limited setting in geriatric aesthetics for various indications and the psychology of the geriatric patient is to be reviewed in the narration.

Methods: Various articles were traditionally reviewed from the pubmed database regarding "cost-effective geriatric aesthetics", "platelet-rich plasma in aging skin" and "psychology of aging".The literature is analyzed with our discipline of technique and narrated after searching the literature.

Results: We address the immense need for appropriate patient selection, analysis of motivation and evaluation of patient psyche, economy and expectations for an ethical geriatric aesthetic practice in a resource limited setting. We also recommend the change of nomenclature of Platelet-poor plasma to "Plasma beyond platelets" as the uses of plasma are multitudinous.

Limitation: No qualititative analysis was done in the study.

Conclusion: The practice of geriatric aesthetics in resource limited setting is meticulous and needs great dedication.

***Corresponding author**

Dilip kachhawa, Senior Professor and Head, MDM Bungalow No 3, Outside Gate 3, MDM Campus, Shastri Nagar, Jodhpur, Code: 342003, India.
E-mail: drdilipkachhawa@hotmail.com

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Abbreviatons

AGA- Androgenetic Alopecia
Bcl-2- B cell Lymphoma protein 2
CaCl2- calcium chloride
CD- cluster differentiation
Co2- Carbon Dioxide
COL1A1- genes for collagen 1 alpha 1
COL1A2- genes for collagen 1 alpha 2
FGF7- fibroblast growth factor 7
HIV- human Immuno-deficiency Virus
LASIK- Laser-assisted in-situ keratomileusis
L-PRF- Leukocyte rich Platelet rich fibrin
L-PRP- Leukocyte rich Platelet rich plasma
MMP - matrix metalloprotease
m-RNA- messenger ribonucleic acid protein
NSAIDS- Non-steroidal Anti-infammatory drugs
PDGF- platelet derived growth factors
PRF- platelet rich fibrin
PRFM- platelet rich fibrin matrix
PRP- platelet rich plasma
P-PRP- pure-PRP
P-PRF- Pure PRF
SVF- stromal vascular fraction
RT-PCR- Real time polymerase chain reaction
VEGF- vascular endothelial growth factor

Introduction

Epidemiology of geriatric group in India

The financial inequalities in India is a crisis for better living, besides the religious and cultural disparities. But, the land has an agreement in improvement, effort, and life. The six low revenue Indian states Assam, Chhattisgarh, Nagaland, the Madhya Pradesh, Odisha and Uttar Pradesh–are home to larger than one-third of India's residents. Selvaraj et al estimated the economic misfortune to affordable medicines in India that

dwindled from 31.2% to 8.9% for in-patient care and from 17.8% to 5.9% for out-patient care. Consequently, common people suffer due to the inequalities and diverge to the pharmaceuticals thereby, constrained to misguidance and poly-pharmacy [1].

Current trends of geriatric aesthetics in India

In the soaring covid19 pandemic, esthetics in this denomination is a remote prerogative. Mac cullam et al, affirms the distress of the geriatric community in India that, almost 75% of the economically dependent old adults grieve from stress [3]. The geriatric population constitutes the group that desires aesthetic support of distinct varieties. The eminent victim of beauty was Queen Elizabeth 1 who is recognized for caking white lead makeup over her face to conceal the smallpox scars and consequently suffered from lead toxicity. It is stated that she lost her hair and teeth that she never viewed her in the mirror thereafter stating that the need for better looks is not a current trend [2].

The confrontation of unrealistic community by dermatologists

Moon light and Moon walk face of Michael Jackson stunned every American youth in the last centenary and the sense of being privileged was related to having fair skin and good looks. In research by MacCallum and colleagues, the media's projection on "aging beauties" as somebody who has the frame of youthful women was connected with a disruption in eating attitudes in women aged 30–65 [3].

Psychology of aging

Da Costa et al. mentions that "Elderly must learn to age" because Westernly culture is a youth-oriented pop culture, exploring any possible means to preserve youth and giving elder people a more leisurely or dim trait including mass media programs that wilfully magnifies this comprehension to their advantage [4,5].

Hardships in a resource impaired locale

Botulinum toxin, threads, Lasers, and Fillers are the discussion of the present around the globe. Unfortunately, any of these are exceeding the reach of the majority of the population seeking a permanent solution at an economical charge in a few appointments. Also, storage of Botulinum toxin is an issue in a government set-up and the demand for repeated injections can be hindering in a low source background [6,7].

Objectives

To explain the cost-effectiveness of the platelet-rich plasma therapy formulated in our hospital comparing with research data of the past to understand the differences and to evaluate the pros and cons of our technique through a narrative review.

Methods

Methodolgy of Literature review

A literature analyses was done from the Pubmed database from 2004- 2021 by searching the keywords based on MeSH terms and the terms "plasma, platelet rich" showed two articles while "platelet rich plasma and skin aging" showed four articles and around 150 articles were found in the term "plasma" of which 20 articles were related to platelet rich plasma and 74 articles were found based on the term "PRP" of which only 13 articles were related to anti-aging, six articles were found based on "anti-aging" and five articles were found after doing advanced search by combining three terms. After scrutinizing, Fifty articles were considered for review while 13 articles followed articles followed three on seven criteria, while 12 articles followed five on seven criteria, no article followed less than three criteria. The selection criteria based on standard textbook information and the technique of platelet-rich plasma was narratively reviewed. Most reviews had their narration of PRP preparation (n = 39) and anti-aging effects documentation (n = 27). Only three decription matched the preparation method of our institution while all reviews had specified methods of describing objectives and validation methods included information. The other aspect studied was the psychology of aging which was mentioned in eight articles and its inferences are reviewed. No statistical analysis was done.

Selection criteria

1. Study population must be above middle age of life
2. Studies on economical anti-aging modalities
3. Study must be on platelet rich plasma and its fractions
4. Study on aging psychology and media

All studies that are not appropriate for selection were excluded.

Methodology of Platelet rich plasma preparation and injection considered for review:

Inclusion criteria

1. Geriatric population seeking aesthetic aid
2. Hemodynamic stability
3. Willing to participate

Exclusion criteria

1. Unrealistic expectation
2. Reluctance to follow-up
3. Other contra-indication for PRP such as platelet disorders and systemic co-morbidities.

Preparation of PRP [16-20]

Reviewing various techniques, there appears no definitive protocol for preparation nor the frequency of PRP sessions. The interval and the follow-up also varied. We follow the double spin process of PRP preparation in our discipline. The PRP will be formulated under the observation of professionals from the blood transfusion unit. Following verbal and written consent, an 8.5 ml blood sample is withdrawn in an Acid Citrate Dextrose (ACD) vacutainer tube. The two spin technique consists of a 1200 rpm soft spin for 8 minutes upon which the buffy coat and supernatant plasma are separated. The separated deeper portion containing the buffy coat will undergo second centrifugation, at 2400 rpm called the hard spin for 4 minutes. The deeper layer of second spun material will be counted for platelet score.

Procedure of injection

Technique at our setting: One hour before the procedure, local anesthetic cream (2.5% lignocaine + 2.5 prilocaine) will be applied over the region to be managed after excluding drug allergy to lignocaine. The procured PRP will be shot by an intra-dermal technique in which multiple small fractions are injected in a linear pattern 1mm apart to cover the planned region. This is done under aseptic care. The sum of sessions differs depending on the initial examination of the patient and the disease treated.

Results and Discussion

Aging gracefully does not imply to resemble 30 at 60 years. Such is against the rule of life. Geriatric aesthetics is desired to break the impression of freezing the skin or plastic face. In actuality, the above-explained might be partway conceivable if we graze the Internet to watch actresses being honored for arresting senescence for decades with "Botulinum toxin" shots.

Climatic changes in India

India has diverse climates from the North to the South with the West staying arid most of the seasons. The inevitable harm of Ultraviolet radiation on Indian skin (predominantly type 4 in the Fitzpatrick scale) is subjected to photo-aging emphasizing the real need for aesthetic aid in this subset. Major alterations within the dermis like an increase in the number of glycosaminoglycans and proteoglycans on mounting of MMPs with increased numbers of hyperplastic fibroblasts associating to the change [6]. The bulk of cutaneous transformations of photoaging were studied by Thappa and colleagues which revealed that dyspigmentation, freckles, thick skin, deep wrinkles, and senile purpura were common in India [4,7]. They also inferred that these pertained to racial and occupational factors, male gender, and smoking. Smoking was associated with deep wrinkles. Similarly, menopause stimulated chronologic aging in females due to a drop in estrogen [7].

Platelet rich plasma

Androgenetic alopecia is one of the basic concerns for people above 45 to 65 years of age. Similarly, facial rejuvenation is also desired by many old females. Common medications for Androgenetic alopecia may not be perpetually restorative. They compel lengthy abidance with distasteful results. Platelet-rich plasma (PRP) is an autologous and cost-effective modality with promising results although the training trajectory in preparation of PRP in a resource-limited setting is steep. Platelet-rich plasma (PRP) is a fraction of blood plasma enriched with platelets. This is achieved by centrifugation of venous blood, and retrieving the platelet-rich middle portion [10]. Objective platelet concentrations fluctuate, but a reasonable quantity is more than 10,00,000 platelets/ ul.

Mechanism of action

Platelets are understood to exude protein growth factors like platelet-derived growth factor and transforming growth factor in addition to vascular endothelial growth factor, fibrin, fibronectin, and vitronectin, the latter act as cell adhesion molecules [10,11]. Thus, PRP manipulates cell migration, and differentiation besides altering the extracellular matrix therefore is exploited in various fields of regenerative medicine. The growth factors are assumed to be discharged upon activation, the reason why some authors favor the addition of an activator [12]. Various structures were designed by numerous groups to furnish an adequate environment for a generative platelet action. But in this paper, we imply that conventional dual-spin technique in a commonly employed centrifuge machine can entrust a comparable potency by experienced workers [12,13].

Up regulating the β-catenin pathway, the activated PRP provokes the proliferation of dermal papilla cells, and increases the dermal papilla cell growth [14,34]. PRP is presumed to lengthen the anagen phase through the boosted expression of FGF-7 and increases cell survival by impeding apoptosis (related with increased Bcl-2 protein levels). It promotes the health of peri-follicular vascular plexus, through the rise in VEGF and PDGF levels, which have an angiogenic potential [14].

Types of PRP [15].

Dohan Ehrenfest et al. classification based upon the cell content and fibrin architecture are given below:

- Pure PRP (P-PRP) or leukocyte-poor platelet-rich plasma-low-density fibrin network on activation;
- Leukocyte- and platelet-rich plasma (L-PRP) products-low-density fibrin network on activation;
- Pure platelet-rich fibrin (P-PRF) or leukocyte-poor- fibrin network of high-density. P-PRP-with an activator and a specific separator gel is used
- Leukocyte- and PRF (L-PRF) or second-generation PRP products-leucocytes and a high-density fibrin network. (Centrifuged immediately without any anticoagulant, thrombin or CaCl2)

We use the type 1 PRP which has a pure platelet-rich plasma in all patients who are chosen appropriately as many geriatric populations have one or other contra-indication. It is vital to state that our technique does not obligate the need for an activator. Largest of the studies did not systematize their activation strategy. But the popular activators were calcium gluconate, calcium chloride and calcium chloride with thrombin [16].

Contraindications [15].

- Platelet related disorders; systemic disorder affecting hemodynamic homeostasis; infection at target site or failing to provide consent are absolute contraindications.
- Patients with history of NSAID intake should be asked for drug intake within 48 hours at the time of procedure
- Corticosteroid injection at a treatment site within 1 month/ Systemic use of corticosteroids within 2 weeks; Cancer-especially hematopoietic or bone; Haemoglobin<10 g/dL or Platelet count <105/μL are relative contraindications by Dohan et al [15].

Image 1 and 2 shows the improvement in hair density using PRP in a geriatric man for androgenetic alopecia (grade 5A) at week 0 and 24 of follow up

Image 1: Shows the improvement in hair density using Platelet rich plasma in a geriatric man for androgenetic alopecia (grade 5A) at week 0

Image 2: Shows the improvement in hair density using PRP in a geriatric man for androgenetic alopecia (grade 5A) at week 24 of follow up

Adverse Effects

Unfavorable consequences of PRP are minuscule. Being autologous rules out any serious adverse effects, injection site reactions are uncommon that can be managed symptomatically. PRP has no dangers of transmitting infections such as hepatitis-B, C, or HIV [21].

PRP promotes graft survival

We also use PRP for follicular graft salvation because the growth factors can augment graft survival as studied by Kang et al [17]. PRP as an incubation medium in follicular unit transplantation was also studied by Uebel et al. where the Plasma factors were introduced while harvesting follicular grafts and yielded better graft survival [16]. Kang et al.a suggested that The CD34+ hematopoietic stem cells mobilized in peripheral blood and further concentrated in PRP prepared could have synergistic effects on PRP-induced angiogenesis in patients with pattern hair loss. PRP used as mesotherapy in AGA patients has also shown promising results [17].

The mitogenic effects of PRP are only limited to augmentation of the normal healing process and are theoretically not mutagenic, as the GFs released do not enter the cell or its nucleus, but only bind to the membrane receptors and induce signal transduction mechanisms hence the other uses of PRP and its fractions can be explained [16].

Modifications of PRP and its applications:

Aging is an immutable scenario that is influenced by intrinsic and extraneous characteristics. Alam and colleagues support the use of PRP in photoaged facial skin as more than 1100 proteins were detected in PRP and various enzymes and growth factors involved in regenerative tissue biology were also emphasized by Du et al. which enumerates the multitudinous implications of PRP in old adults [22,23].

The research on the bioactive components by Pavlovic et al reports that internal determinants at the molecular level govern the epidermal microenvironment over the years and such factors alter the Matrix metallic protease leading to the accumulated reactive oxygen species driven injures to the collagen microfibrils causing the skin to lose texture [16,24].

PRP for rejuvenation

The basic anti-aging mechanism is the neo-collagenesis in by chemicals, lights, and recently various fractions of Platelet-rich plasma was also consistent with the findings of Pavlovic et al [24]. Abuaf et al, demonstrated the new collagen synthesis by intradermal injections of PRP derived Growth factors and measuring the reduction in rhytides [25]. A minimum of 3 weeks was desired for any visible transformation in this study. Advanced scarring that can not be addressed with regenerative therapies will need resection of surgical scars. In this scenario, PRP can be used to augment the surgically contracted scar and the fractions of PRP such as platelet-rich fibrin is more beneficial for this plan. Synthetic Fillers are man-made while PRP is a biological equivalent, more economical, and safe on adult skin and hair [25-27]. The stimulating effect on fibroblasts was studied by Scarano et al. which supplemented that microporous tricalcium with autologous platelet-derived growth factors could increase the volume and the duration of soft tissue augmentation [28,29].

Breast augmentation [30-34].

Lax breasts can be fixed with PRP and Threads hence, are often sought by women who are found to associate their feminity with the silhouette of their body. Post-menopause, the breasts sag down which is due to the fall in hormones. PRP including its fractions can contribute to two methods. It can either give firmness by their filling effect or can be utilized with a fat graft to heighten graft endurance.

Breast lift

Fat transfer technique to bolster the cleavage is one of the western trends striding into the country. The disadvantages of fat grafting according to Yoshimura and colleagues were an unpredictable re-absorption rate with the need for repeated procedures, micro-calcifications leading to fat necrosis. This is enriched by Platelet-rich plasma as an adjuvant to avoid the hay-wiring of the tissue which is a familiar side effect attributed to the blockage of blood vessels [31,32].

Modarressi et al. documented several other adjunct therapies including the stromal vascular fraction (SVF), enhancing angiogenesis by the addition of growth factors, or the use of chemical cell-stimulating factors, such as insulin or erythropoietin [33]. PRP is superior and economical besides, when combined with a fat graft, it can restore the consistency to that of the healthy breasts with real shaping and texture [34].

Simple augmentation with PRP as a single therapy is comfortable and fairly efficient in rebuilding the naturally aging breast mass [34]. PRP is also used for Nasolabial folds, tear trough correction, malar augmentation, Neckline correction, and hand rejuvenation as a part of regional aesthetics [30,34].

Fractions of PRP

Platelet poor plasma is a component of plasma collected to formulate a Plasma gel (filler) and its advantages are diverse. This ideally is obtained from the supernatant of the first spun PRP and is considered to have the least platelet content. Yet, its position in regenerative medicine implies that the restorative dynamism of plasma is ahead of platelets. When added to PRP, Platelet poor plasma renders the matrix to grow by inducing COL1A1 and COL1A2 mRNA expression as detected by RT-PCR by Man and colleagues, showing that platelet-poor plasma should carry a range of growth factors thus it is appropriate to re-name them as “plasma beyond platelets” [14,35]. Other uses of platelet-poor plasma constitutes, acne scars, rhytides, periorbital sagging, sunken face or lipodystrophy, blepharo-chalasia, lip and nose augmentation, augmentation of the genital region such as sagging, facial deformities, scleroderma, among others. Complications may include granuloma, an inflammatory nodule that is prevalent even in the synthetic filler [36].

PRF- platelet-rich fibrin is prepared by centrifugation blood without an anticoagulant at a rate of 3000 rpm for 8 minutes and the fibrin thus procured is instantly injected intra-dermally for facial rejuvenation indicated as in dermal fillers [20,37]. No critical negative effects observed.

But the timely use of the fibrin is crucial and if provided a delay, PRF coagulates to form a Matrix, so-called PRFM. In this paper, we illustrate the Uni-lateral Brow lift in a 55 year old female using Platelet-rich fibrin and compared with the contralateral side at 3rd week post second session (Image 3)

Image 3: Shows Uni-lateral Brow lift in a 55 year old female using Platelet-rich fibrin and compared with the contralateral side at 3rd week post second session

PRFM-platelet-rich fibrin matrix: the matrix is a sustained release PRF and augments healing of scarring tissue in a chronic Nonhealing ulcer besides it also prevents infection [37,38]. Ulcer is greatly challenging to the skin specialists while dealing with diabetic senior patients and in Hansen disease. PRFM is extensively used in regenerative medicine, in maxillofacial surgeries for rejuvenation of periodontal tissue and as implants, in dentistry [39,40]. The matrix generated is set as a biological dressing after debriding the wound tissue [41].

Image 4: Shows pre-procedural peri ocular melanoses (dark circles) which were managed with Platelet rich plasma in three sessions that were two weeks apart in our hospital and there was good to excellent change and the patient was remarkably fulfilled. The pre and post-treatment Image 5 are given below.

Image 5: Shows post-procedural improvement in Peri-orbital melanoses (dark circles) which were taken after three sessions of Platelet rich plasma two weeks apart

Sclafani, after a series of three intra-dermal platelet-rich fibrin matrix injections, observed a significant increase in hair density in management of AGA thus showing that Plasma-derived components are suitable for all branch of regenerative medicine [42].

Other uses of PRP in geriatrics [43-47].

1. Scar revision - Alser et al confirmed that PRP can improve the quality of atrophic scars when treated with ablative fractional CO2 laser and PRP. Furthermore PRP, was found to lessen the laser-related side effects
2. Striae distensae (stretch marks) Suh et al evaluated the efficacy of twice-weekly plasma fractional radiofrequency of four session and trans-epidermal delivery of platelet-rich plasma using ultrasound in eighteen patients and reported that 72% were very satisfied with the treatment [43].
3. Melasma and dyspigmentation: PRP mesotherapy technique were performed by Cayrili et al. At the end of the third twice-weekly session of PRP treatment, more than 80% reduction in Melasma scores were reported [45].
4. Lipodermatscleroses and Vitiligo
5. Franic, and colleagues reported a case of vulvar lichen sclerosis treated with PRP [47].
6. Peri ocular melanoses (dark circles) were managed with PRP in three sessions that were two weeks apart in our hospital and there was good to excellent change and the patient was remarkably fulfilled. The pre and post-treatment Image 5 are given below.
7. Other uses of PRP in medical fields- grafts (bone/sinus), tendinopathy, fat transfer, wound healing, osteoarthritis, dry eye syndrome, and in post LASIK ocular surface syndrome [46]..

Other Considerations In Aesthetics Of Geriatrics [34].

1. Good counseling and understanding the needs of patients [48].
2. Patient consent and documentation: Structured selection norms with a robust, instructive and satisfactory statement letter or fair communication between the client and treating doctor forms the basis of an ethical practice [49].
3. Rectifying unrealistic outlooks plausibly by communicating the desirable, declaring the foreseeable truth, or demonstration of substantial datum will equip the client to optimize the prospects in the procedure.
4. Good photographic skills and lighting [34,50].
5. Medico-legal issues and learning curve
6. Role of teledermatology: Teledermatology is an experiment in our country due to the scarcity of knowledge, moderate to poor connectivity in remote areas, affordability issues, and technology illiteracy amongst others. Cyber-crime can drive to a breach of privacy which is a punishable offense hence teledermatology is a developing area that is also a need of the moment due to the covid19 pandemic [51,52].

Accessibility of the Geriatric Population

A study in rural Meerut, a district in the Uttar Pradesh state of India mentioned that an average of 46.3% of participants was ignorant of the nearby geriatric services and 96% had never utilized any geriatric welfare service [53]. This inadequacy of knowledge in detecting the available cost-beneficial possibilities reflects not only the patient's ignorance but also the deficiency in public education, mass media communication, societal shortage in addressing geriatric needs, or the illiteracy rates of Indian geriatric mass.

Superficial	Glycolic acid 30-70% Salicylic acid 15% TCA 10% Mandelic acid 30% Jessner's solution	Dark skin-all
Mid deep	GA 70% Pyruvic acid (30%) Malic acid 30% Kojic acid 10% Azelaic acid 30% Salycilic acid 33%	Dark skin: SA20%-30% TCA 10-30%
Deep	Phenol Combination peel 50% salycilic acid TCA 30%	
Combination	Salycilic + TCA Glycolic +TCA Peeling + dermabrasion Peeling + subscision/ other techniques of acne scar surgery	Dark skin: Glycolic 70%/ jessner +35%TCA

Individual peels	Indications	Advantages	Disadvantage
• Glycolic acid (30-70%) Improves skin texture, dyschromia, superficial wrinkles and neocollagenesis.	Photodamage-mild to moderate Skin rejuvenation Post inflammatory hyper pigmentation (PIH), smoker skin	Mild erythema/ desquamation	No penetration Risk of overpeel Not in active acne
• Jessner's solution	Dark skin Melasma,PIH	Excellent safety profile Active acne PIH good results	Instability with light Exfoliation excess Resorcinol toxicity
• Salycilic acid	PIH Photoaging,melasma Dark skin	Safe Active acne PIH,active acne – good result	Stinging, burning Minimal in photoage.
• TCA	Actinic keratosis PIH, solar lentigo	Low cost Frosting seen	Stinging Not for asian skin in high concentration
• Malic acid	PIH	All skin types	Minimal efficacy
• Deep peel	Perioral wrinkles Atrophic acne scars Severe photodamage	Severe photodamage	Cardiotoxicity PIH risk
• SA+TCA	Melasma, solar lentigo PIH Acne scars, Actinic keratosis Moderate to severe photodamage	All skin types	Overpeel risk
• GA+TCA	Moderate to severe photodamage		

Conclusion

Platelet-rich plasma is an exciting, adaptable, cost-effective modality in geriatric aesthetics in which patient motives, good communication, and ceaseless attempt to recognize the demands of the old adults will unravel the roads less traveled.

References

1. Selvaraj S, Farooqui HH, Karan A (2018) Quantifying the financial burden of households' out-of-pocket payments on medicines in India: a repeated cross-sectional analysis of National Sample Survey data, 1994-2014. BMJ Open 8: e018020.
2. Elizabeth I (2020) Queen of England. A life in portraits. https://www.historic-uk.com/HistoryUK/HistoryofEngland/Elizabeth-I-Life-in-Portrait/.
3. MacCallum F, Widdows H (2018) Altered Images: Understanding the Influence of Unrealistic Images and Beauty Aspirations. Health Care Anal 26: 235-245.
4. Da Costa JP, Vitorino R, Silva GM, Vogel C, Duarte AC, et al. (2016) A synopsis on aging-Theories, mechanisms and future prospects. Ageing Res Rev 29: 90-112.
5. Maisel A, Waldman A, Furlan K (2018)Self-reported Patient Motivations for Seeking Cosmetic Procedures. JAMA Dermatol 154:1167-1174.
6. Poon F, Kang S, Chien AL (2015) Mechanisms and treatments of photoaging. Photodermatol Photoimmunol Photomed 3: 65-74.
7. Durai PC, Thappa DM, Kumari R, Malathi M (2012) Aging in elderly: chronological versus photoaging. Indian J Dermatol 57: 343-352.
8. Niamtu J 3rd (2009) Complications in fillers and Botox. Oral Maxillofac Surg Clin North Am 2:13-v.
9. Susmita A, Kolli NN, Meka S (2016) An Evaluation of Use of Botulinum Toxin Type A in the Management of Dynamic Forehead Wrinkles - A Clinical Study. J Clin Diagn Res10: ZC127-ZC131.
10. Samadi P, Sheykhhasan M, Khoshinani HM (2019) The Use of Platelet-Rich Plasma in Aesthetic and Regenerative Medicine: A Comprehensive Review. Aesthetic Plast Surg 43: 803-814.
11. Stevens J, Khetarpal S (2018) Platelet-rich plasma for androgenetic alopecia: A review of the literature and proposed treatment protocol. Int J Womens Dermatol 5: 46-51.
12. Maria-Angeliki G, Alexandros-Efstratios K, Dimitris R, Konstantinos K (2015) Platelet-rich Plasma as a Potential Treatment for Noncicatricial Alopecias. Int J Trichology7: 54-63.
13. Garg S, Manchanda S (2017) Platelet-rich plasma-an 'Elixir' for treatment of alopecia: personal experience on 117 patients with review of literature. Stem Cell Investig 4: 64.
14. Man D, Plosker H, Winland-Brown JE (2001) The use of autologous platelet-rich plasma (platelet gel) and autologous platelet-poor plasma (fibrin glue) in cosmetic surgery. Plast Reconstr Surg107: 229-239.
15. Dohan Ehrenfest DM, Andia I, Zumstein MA, Zhang CQ, Pinto NR, Bielecki T (2014) Classification of platelet concentrates (Platelet-Rich Plasma-PRP, Platelet-Rich Fibrin-PRF) for topical and infiltrative use in orthopedic and sports medicine: current consensus, clinical implications and perspectives. Muscles Ligaments Tendons J 4: 3-9.
16. Uebel CO, Da Silva JB, Cantarelli D, Martins P (2006) The role of platelet plasma growth factors in male pattern baldness surgery. Plast Reconstr Surg118:1458-1467.
17. Kang JS, Zheng Z, Choi MJ, Lee SH, Kim DY, et al. (2014) The effect of CD34+ cell-containing autologous platelet-rich plasma injection on pattern hair loss: a preliminary study. J Eur Acad Dermatol Venereol 28: 72-79.
18. Dhurat R, Sukesh M (2014) Principles and Methods of Preparation of Platelet-Rich Plasma: A Review and Author's

Perspective. J Cutan Aesthet Surg 7:189-197.
19. Chahla J, Cinque ME, Piuzzi NS (2017) A Call for Standardization in Platelet-Rich Plasma Preparation Protocols and Composition Reporting: A Systematic Review of the Clinical Orthopaedic Literature. J Bone Joint Surg Am 99:1769-1779.
20. Dohan Ehrenfest DM, Pinto NR, Pereda A (2018) The impact of the centrifuge characteristics and centrifugation protocols on the cells, growth factors, and fibrin architecture of a leukocyte- and platelet-rich fibrin (L-PRF) clot and membrane. Platelets 29:171-184.
21. Penner M, Sibrowski W (1994) Nutzen und Risiken der Eigenblutspende [Benefits and risks of autologous blood donation]. Infusionsther Transfusionsmed 2: 64-68.
22. Alam M, Hughart R, Champlain A (2018) Effect of Platelet-Rich Plasma Injection for Rejuvenation of Photoaged Facial Skin: A Randomized Clinical Trial. JAMA Dermatol 154:1447-1452.
23. Du R, Lei T (2020) Effects of autologous platelet-rich plasma injections on facial skin rejuvenation. Exp Ther Med 19: 3024-3030.
24. Pavlovic V, Ciric M, Jovanovic V, Stojanovic P (2016) Platelet Rich Plasma: a short overview of certain bioactive components. Open Med (Wars) 11:242-247.
25. Abuaf OK, Yildiz H, Baloglu H, Bilgili ME, Simsek HA, et al. (2016) Histologic Evidence of New Collagen Formulation Using Platelet Rich Plasma in Skin Rejuvenation: A Prospective Controlled Clinical Study. Ann Dermatol 28:718-724.
26. Yuksel EP, Sahin G, Aydin F, Senturk N, Turanli AY (2014) Evaluation of effects of platelet-rich plasma on human facial skin. J Cosmet Laser Ther 16: 206-208.
27. Macaulay IC, Carr P, Gusnanto A, Ouwehand WH, Fitzgerald D, et al. Platelet genomics and proteomics in human health and disease. J Clin Invest 115: 3370-3377.
28. Scarano A, Valbonetti L, Marchetti M, Lorusso F, Ceccarelli M (2016) Soft Tissue Augmentation of the Face With Autologous Platelet-Derived Growth Factors and Tricalcium Phosphate. Microtomography Evaluation of Mice. J Craniofac Surg 27:1212-1214.
29. Scarano A, Ceccarelli M, Marchetti M, Piattelli A, Mortellaro C (2016) Soft Tissue Augmentation with Autologous Platelet Gel and β-TCP: A Histologic and Histometric Study in Mice. Biomed Res Int 2016:2078104.
30. Arsiwala SZ (2015) Current Trends in Facial Rejuvenation with Fillers. J Cutan Aesthet Surg 8:125-126.
31. Liao HT, Marra KG, Rubin JP (2014) Application of platelet-rich plasma and platelet-rich fibrin in fat grafting: basic science and literature review. Tissue Eng Part B Rev 20: 267-276.
32. Yoshimura K, Sato K, Aoi N, Kurita M, Hirohi T, et al. (2008) Cell-assisted lipotransfer for cosmetic breast augmentation: supportive use of adipose-derived stem/stromal cells. Aesthetic Plast Surg 32: 48-57.
33. Modarressi A (2013) Platlet Rich Plasma (PRP) Improves Fat Grafting Outcomes. World J Plast Surg 2: 6-13.
34. Mysore V (2012) ACS (I) Textbook on Cutaneous and Aesthetic Surgery. New Delhi: Jaypee Brothers 883-893.
35. Kim DH, Je YJ, Kim CD (2011) Can Platelet-rich Plasma Be Used for Skin Rejuvenation? Evaluation of Effects of Platelet-rich Plasma on Human Dermal Fibroblast. Ann Dermatol 23: 424-431.
36. Redaelli A, Romano D, Marcianó A (2010) Face and neck revitalization with platelet-rich plasma (PRP): clinical outcome in a series of 23 consecutively treated patients. J Drugs Dermatol 9: 466-472.
37. Miron RJ, Fujioka-Kobayashi M, Bishara M, Zhang Y, Hernandez M, et al. (2017) Platelet-Rich Fibrin and Soft Tissue Wound Healing: A Systematic Review. Tissue Eng Part B Rev 23: 83-99.
38. Zhang W, Guo Y, Kuss M (2019) Platelet-Rich Plasma for the Treatment of Tissue Infection: Preparation and Clinical Evaluation. Tissue Eng Part B Rev 25: 225-236.
39. Ghanaati S, Herrera-Vizcaino C, Al-Maawi S (2018) Fifteen Years of Platelet Rich Fibrin in Dentistry and Oromaxillofacial Surgery: How High is the Level of Scientific Evidence?. J Oral Implantol 44: 471-492.
40. Fan Y, Perez K, Dym H (2020) Clinical Uses of Platelet-Rich Fibrin in Oral and Maxillofacial Surgery. Dent Clin North Am 64: 291-303.
41. Naik B, Karunakar P, Jayadev M, Marshal VR (2013) Role of Platelet rich fibrin in wound healing: A critical review. J Conserv Dent16: 284-293.
42. Sclafani AP (2014) Platelet-rich fibrin matrix (PRFM) for androgenetic alopecia. Facial Plast Surg 30: 219-224.
43. Suh DH, Lee SJ, Lee JH, Kim HJ, Shin MK, Song KY (2012) Treatment of striae distensae combined enhanced penetration platelet-rich plasma and ultrasound after plasma fractional radiofrequency. J Cosmet Laser Ther 14: 272-276.
44. Alser OH, Goutos I (2018) The evidence behind the use of platelet-rich plasma (PRP) in scar management: a literature review. Scars Burn Heal 4: 2059513118808773.
45. Cayırlı M, Calışkan E, Açıkgöz G, Erbil AH, Ertürk G (2014) Regression of melasma with platelet-rich plasma treatment. Ann Dermatol 26: 401-402.
46. Everts PA, Hoogbergen MM, Weber TA, Devilee RJ, van Monftort G, et al. Is the use of autologous platelet-rich plasma gels in gynecologic, cardiac, and general, reconstructive surgery beneficial?. Curr Pharm Biotechnol 13:1163-1172.
47. Franic D, Iternička Z, Franić-Ivanišević M (2018) Platelet-rich plasma (PRP) for the treatment of vulvar lichen sclerosus in a premenopausal woman: A case report. Case Rep Womens Health18:e00062.
48. Poot F, Sampogna F, Onnis L. Basic knowledge in psychodermatology. J Eur Acad Dermatol Venereol 2: 227-234.
49. Mavroforou A, Giannoukas A, Michalodimitrakis E (2004) Medical litigation in cosmetic plastic surgery. Med Law 23: 479-488.
50. Sachdev M, Britto GR (2014) Essential Requirements to Setting up an Aesthetic Practice. J Cutan Aesthet Surg 7:167-169.
51. Ashique KT, Kaliyadan F (2020) Teledermatology in the Wake of COVID -19 Scenario: An Indian Perspective. Indian Dermatol Online J 1: 301-306.
52. Kanthraj GR. Newer insights in teledermatology practice. Indian J Dermatol Venereol Leprol 77:276-287.
53. Nath A, Ingle G (2008) Geriatric health in India: Concerns and solutions. Indian Journal of Community Medicine 33:214.